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National Priority Chemicals Trends Report (2000-2004)

Section 4
Chemical Specific Trends Analyses for Priority Chemicals (2000−2004): Cadmium and Cadmium Compounds (Cadmium)

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Cadmium and Cadmium Compounds (Cadmium)

Chemical Information:

CAS Number − 7440−43−9

General Uses – Cadmium, used in this country, is obtained as a by−product from melting zinc, lead, or copper ores. The cadmium by−product is used in metal plating and to make pigments, batteries and plastics.

Potential Hazards − Cadmium and its salts are highly toxic. Breathing high levels of cadmium severely damages the lungs and can cause death.

Summary Analysis:

- NATIONAL – In 2004, 63 facilities reported approximately 885,000 pounds of cadmium. From 2000 to 2002, the quantity of cadmium decreased by approximately 50 percent, but has increased each year since 2002.
- REGIONAL − In 2004, facilities in three regions (Regions 4, 6, and 10) reported approximately 75 percent of cadmium; Region 6 facilities accounted for approximately 46 percent of the total quantity.
- STATES − Facilities in 34 states reported cadmium quantities for 2000−2004; in 2004, facilities in 26 states reported this PC. Facilities in nine of the states reported 90 percent of the total quantity in 2004. A facility located in Oklahoma (SIC 3341) accounted for virtually 100 percent of the total state quantity and approximately 44 percent of the total national quantity of cadmium in 2004. The cadmium from this facility was derived from electric arc furnace dust during the recovery process to extract zinc and lead from these dusts.
- MANAGEMENT – In 2004, the entire PC quantity of cadmium was land disposed, primarily using offsite disposal (79%). Also, approximately 634,000 pounds of cadmium were recycled.
- FACILITIES − Two facilities accounted for approximately 60 percent of the total quantity of this chemical. Twelve facilities accounted for 90 percent of the total quantity.
- INDUSTRY SECTORS − Facilities in 42 industry sectors reported cadmium in one or more years from 2000 to 2004; facilities in 25 of these industry sectors reported this PC in 2004. Facilities in eight industry sectors accounted for 95 percent of this chemical in 2004. Facilities in SIC 3341 (Secondary nonferrous metals) reported the highest quantities, accounting for approximately 49 percent of the total quantity of cadmium reported in 2004. Approximately 91 percent of this quantity was reported by one facility, located in Oklahoma.

National Trends:

Exhibit 4.46 shows the number of facilities that reported cadmium in 2000 to 2004 and the quantities of this PC that were managed via disposal, treatment, energy recovery, and recycling. The number of facilities that reported cadmium since 2001 has been relatively constant; 63 facilities reported this PC in 2004. From 2000 to 2002, the quantity of cadmium decreased by approximately 50 percent but has increased each year since 2002. Even so, the 885,000 pounds of cadmium reported in 2004 represents a decrease of approximately 41 percent, compared to the quantity reported in 2000. A large percentage of the cadmium was sent to land disposal, with approximately 634,000 pounds of this PC being recycled in 2004.

Exhibit 4.46. National Management Methods for Cadmium and Cadmium Compounds, 2000−2004

Management Methods for Cadmium and Number of Facilities	2000	2001	2002	2003	2004	Percent Change (2000−2004)	Management Method − Percent of Quantity of This PC (2004)
Number of Facilities	80	69	71	69	63	−21.3%	-
Disposal Quantity (pounds)	1,356,083	919,994	744,924	824,080	885,122	−34.7%	100.0%
Energy Recovery Quantity (pounds)	0	0	0	0	0	NA	0.0%
Treatment Quantity (pounds)	132,613	12,499	1,550	0	0	−100.0%	0.0%
Priority Chemical Quantity (pounds)	1,488,696	932,493	746,474	824,080	885,122	−40.5%	100%
Recycling Quantity (pounds)*	748,270	469,405	417,697	702,728	634,308	−15.2%	-

*Note: Waste minimization is the emphasis of this Report. As such, we primarily focus on quantities of PCs that are managed via onsite/offsite disposal, treatment, or energy recovery because we believe these PC quantities offer the greatest opportunities for waste minimization. Because recycled quantities of PCs are already directed to their best uses, they are considered separate and distinct from the quantities of PCs not recycled. Throughout this section, the recycled quantity is presented for the purpose of providing some perspective regarding the quantity of this PC already recycled compared to the quantities that are managed via disposal, treatment, and energy recovery and thus potentially available for waste minimization.

Exhibit 4.47 shows the number of facilities that reported cadmium, within ranges of quantities. Of the 63 facilities that reported cadmium in 2004, two facilities accounted for approximately 60 percent of the total quantity of this chemical. Twelve of the 63 facilities accounted for 90 percent of the total quantity.

Exhibit 4.47. Distribution of Quantities by Facilities Reporting Cadmium and Cadmium Compounds in 2004

Cadmium (885,122 pounds)		
Quantity Reported	**Number of Facilities Reporting This Quantity (2004)**	**Percent of Total Quantity of This PC (2004)**
up to 10 pounds	17	less than 0.1%
11 − 100 pounds	1	less than 0.1%
101 − 1,000 pounds	17	0.7%
1,001 − 10,000 pounds	16	8.3%
10,001 − 100,000 pounds	10	30.8%
100,001 − 1 million pounds	2	60.1%
> 1 million pounds	0	0.0%

EPA Regional Trends:

Exhibits 4.48 and 4.49 show the quantity of cadmium that facilities reported for each EPA region in 2000 to 2004. In 2004, facilities in three Regions (Regions 4, 6, and 10) reported approximately 75 percent of the cadmium; Region 6 facilities accounted for approximately 46 percent of the total quantity. Some observations include:

Increases:

- The quantity reported by facilities in Region 6 has steadily increased each year since 2001.
- Facilities in Regions 2, 7, 9, and 10 reported large increases in 2004, compared to quantities reported in 2003.

Decreases:

- Facilities in Regions 1 and 3 reported steadily decreasing quantities since 2000.
- Region 4 facilities reported a large decrease in 2004, compared to the 2003 quantity.
- No facilities in Region 8 reported cadmium since 2001.
- Despite a significant increase in 2004, facilities in Region 10 reported a decrease of approximately 314,000 pounds compared to the quantity reported in 2000.

Exhibit 4.48. Quantity of Cadmium and Cadmium Compounds Reported, by EPA Region, 2000−2004

EPA Region	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Percent Change in Quantity (2000−2004)	Percent of Total Quantity of This PC (2004)
1	50,835	32,866	5,972	4,271	3,621	−92.9%	0.4%
2	26,073	34,434	28,462	8,466	14,421	−44.7%	1.6%
3	157,948	103,399	65,584	79,796	76,988	−51.3%	8.7%
4	169,707	113,933	102,782	173,752	113,189	−33.3%	12.8%
5	209,382	61,863	36,153	48,468	63,426	−69.7%	7.2%
6	366,447	267,921	285,057	389,929	404,177	10.3%	45.7%
7	43,620	17,905	17,851	11,024	37,001	−15.2%	4.2%
8	695	251	0	0	0	−100.0%	0.0%
9	4,029	3,799	7,211	1,818	26,299	552.7%	3.0%
10	459,960	296,122	197,402	106,556	146,000	−68.3%	16.5%
Total	**1,488,696**	**932,493**	**746,474**	**824,080**	**885,122**	**−40.5%**	**100.0%**

Exhibit 4.49. Distribution of Facilities Reporting Cadmium and Cadmium Compounds in 2004 and the Quantities of Cadmium and Cadmium Compounds Reported in 2004, by EPA Region

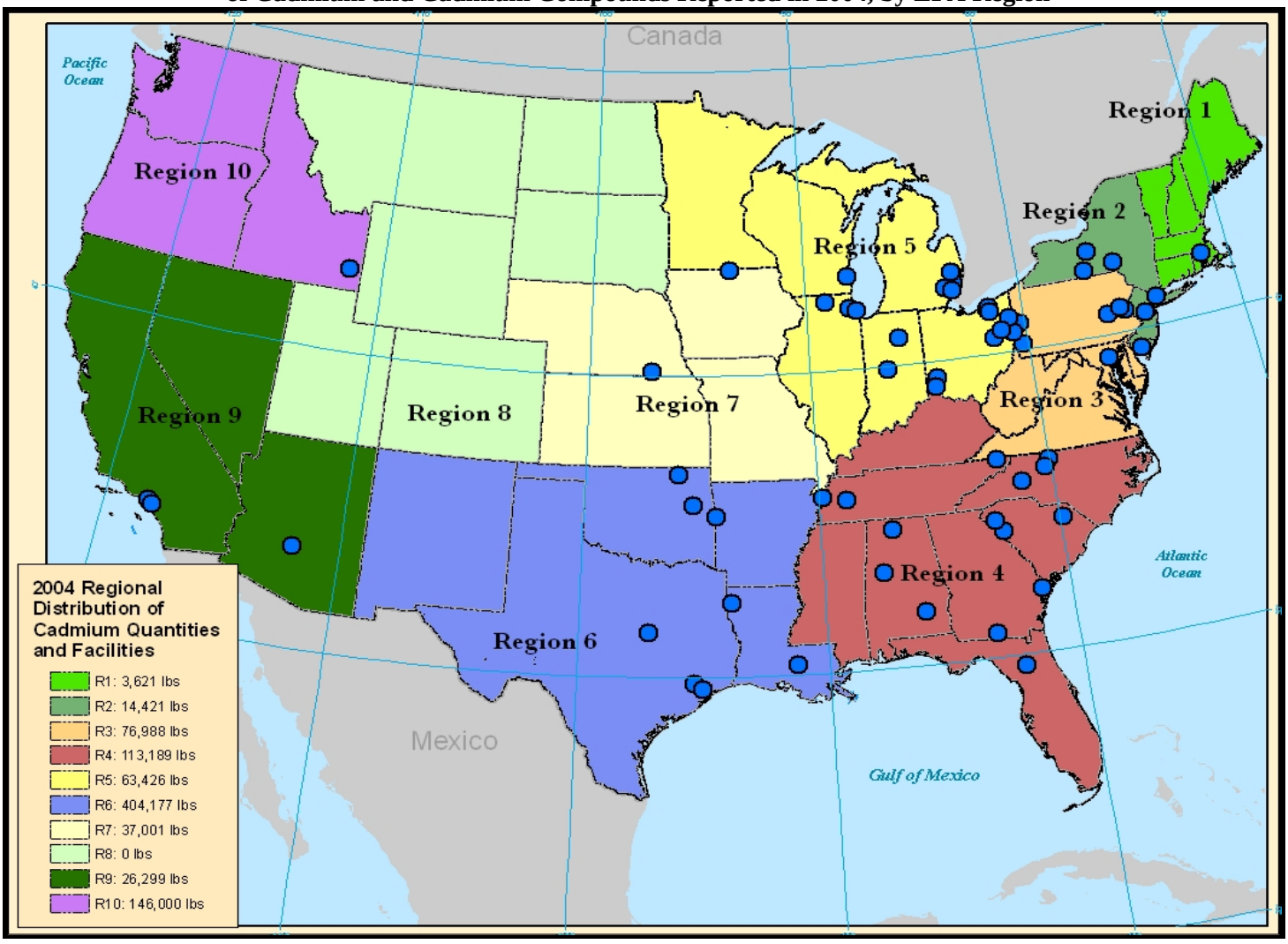


Exhibit 4.50 shows how cadmium was managed by facilities within each EPA region in 2004. A large percentage of the PC quantity of cadmium was land disposed, primarily using offsite disposal (79%). Approximately 634,000 pounds of cadmium were recycled; facilities in each EPA region reported recycling, except in Region 10. Facilities in Regions 3 and 4 reported 73 percent of the total recycled quantity.

Exhibit 4.50. Regional Management Methods for Cadmium and Cadmium Compounds, 2004

EPA Region	Quantity of Cadmium (2004)	Percent of Total Quantity of Cadmium (2004)	Disposal		Energy Recovery		Treatment		Recycling	
			Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
1	3,621	0.4%	0	3,621	0	0	0	0	5,350	180
2	14,421	1.6%	0	14,421	0	0	0	0	6,315	14,878
3	76,988	8.7%	6	76,982	0	0	0	0	15,249	237,060
4	113,189	12.8%	40,519	72,670	0	0	0	0	21,892	188,861
5	63,426	7.2%	0	63,426	0	0	0	0	672	7,947
6	404,177	45.7%	29	404,148	0	0	0	0	20,000	73,557
7	37,001	4.2%	0	37,001	0	0	0	0	0	29,284
9	26,299	3.0%	0	26,299	0	0	0	0	320	12,743
10	146,000	16.5%	146,000	0	0	0	0	0	0	0
Total	**885,122**	**100.0%**	**186,554**	**698,568**	**0**	**0**	**0**	**0**	**69,798**	**564,510**

State Trends:

Facilities in 34 states reported a quantity of cadmium for 2000−2004; in 2004, facilities in 26 states reported this PC. Facilities in nine of the states reported 90 percent of the total quantity in 2004. Oklahoma facilities reported 44 percent of the total quantity; one facility in Oklahoma accounted for virtually the entire quantity of cadmium reported in this state (Exhibit 4.51). Some other observations include:

Increases:

- The quantity reported by a facility in Oklahoma has steadily increased each year since 2001. This facility accounted for virtually 100 percent of the total state quantity and approximately 44 percent of the total national quantity of cadmium in 2004. The cadmium from this facility was derived from electric arc furnace dust during the recovery process to extract zinc and lead from these dusts.
- Compared to quantities reported in 2000, there were significant increases reported by facilities in several states, including Maryland, Arizona, North Carolina, and Indiana.
- Compared to quantities reported in 2003, there were significant increases reported by facilities in Idaho, Nebraska, Ohio, Arizona, and North Carolina.

Decreases:

- Facilities in Michigan, Virginia, and Connecticut reported steadily decreasing quantities since 2000.
- Facilities that had reported cadmium in one or more years during 2000−2003 did not report any in 2004.
- Compared to quantities reported in 2000, there were significant decreases reported by facilities in several states, including Idaho, Pennsylvania, Illinois, Virginia, and Connecticut.
- Compared to quantities reported in 2003, there were significant decreases reported by facilities in several states, including Florida and South Carolina.

Exhibit 4.51. State Quantity Trends for Cadmium and Cadmium Compounds, Based on Largest 2004 Quantity, 2000−2004

State	Quantity (pounds) of Cadmium						Percent Change in Quantity (2000−2004)	Percent of Total Quantity of This PC (2004)
	2000	2001	2002	2003	2004	Change in Quantity (2000−2004)		
OK	298,496	227,190	268,060	372,766	386,537	88,041	29.5%	43.7%
ID	459,895	296,122	197,402	106,556	146,000	−313,895	−68.3%	16.5%
MD	29	42,923	41,171	67,064	69,307	69,278	238890.0%	7.8%
AL	79,728	73,543	78,137	77,169	60,223	−19,505	−24.5%	6.8%
NB	43,606	17,905	17,851	11,024	37,000	−6,606	−15.1%	4.2%
OH	52,715	36,711	16,567	10,082	34,581	−18,134	−34.4%	3.9%
AZ	0	0	0	1,491	25,854	25,854	NA	2.9%
NC	1,756	760	1,220	756	18,773	17,017	969.1%	2.1%
IN	3,051	14,444	9,428	22,825	18,602	15,551	509.7%	2.1%
FL	59,490	17,510	4,440	52,810	15,500	−43,990	−73.9%	1.8%
TN	11,127	11,910	12,159	13,562	14,267	3,140	28.2%	1.6%
TX	10,929	11,660	6,807	11,453	11,080	151	1.4%	1.3%
NJ	14,026	8,645	13,751	8,371	9,031	−4,995	−35.6%	1.0%
WI	8,449	6,998	7,648	7,698	8,347	−102	−1.2%	0.9%
PA	117,820	46,921	18,289	6,940	7,374	−110,446	−93.7%	0.8%
NY	12,047	25,789	14,711	95	5,390	−6,657	−55.3%	0.6%

Exhibit 4.51. State Quantity Trends for Cadmium and Cadmium Compounds, Based on Largest 2004 Quantity, 2000−2004

State	Quantity (pounds) of Cadmium						Percent Change in Quantity (2000−2004)	Percent of Total Quantity of This PC (2004)
	2000	2001	2002	2003	2004	Change in Quantity (2000−2004)		
AR	57,022	29,062	10,189	4,542	5,206	−51,816	−90.9%	0.6%
SC	15,728	7,752	4,201	28,301	4,166	−11,562	−73.5%	0.5%
MA	8,908	1	5,612	1	3,621	−5,287	−59.3%	0.4%
IL	136,627	1,281	2,423	7,785	1,879	−134,748	−98.6%	0.2%
LA	0	9	1	1,168	1,354	1,354	NA	0.2%
CA	4,029	3,799	7,211	327	445	−3,584	−89.0%	0.1%
WV	0	0	0	138	307	307	NA	0.0%
GA	754	754	255	252	261	−493	−65.4%	0.0%
MI	8,535	2,429	86	78	17	−8,518	−99.8%	0.0%
IA	14	0	0	0	1	−13	−92.9%	0.0%
VA	40,099	13,555	6,124	5,654	0	−40,099	−100.0%	0.0%
RI	54	0	0	4,211	0	−54	−100.0%	0.0%
MS	474	1,054	820	903	0	−474	−100.0%	0.0%
CT	41,873	32,865	360	59	0	−41,873	−100.0%	0.0%
KY	650	650	1,550	0	0	−650	−100.0%	0.0%
CO	695	251	0	0	0	−695	−100.0%	0.0%
WA	65	0	0	0	0	−65	−100.0%	0.0%
MN	5	0	0	0	0	−5	−100.0%	0.0%
Total	**1,488,696**	**932,493**	**746,474**	**824,080**	**885,122**	**−603,574**	**−40.5%**	**100%**

Exhibits 4.52 through 4.54 show the trends for the quantities of cadmium in the top five states where facilities reported this PC in 2004.

Exhibit 4.52. Oklahoma and Nebraska Trends for Cadmium and Cadmium Compounds, 2000−2004

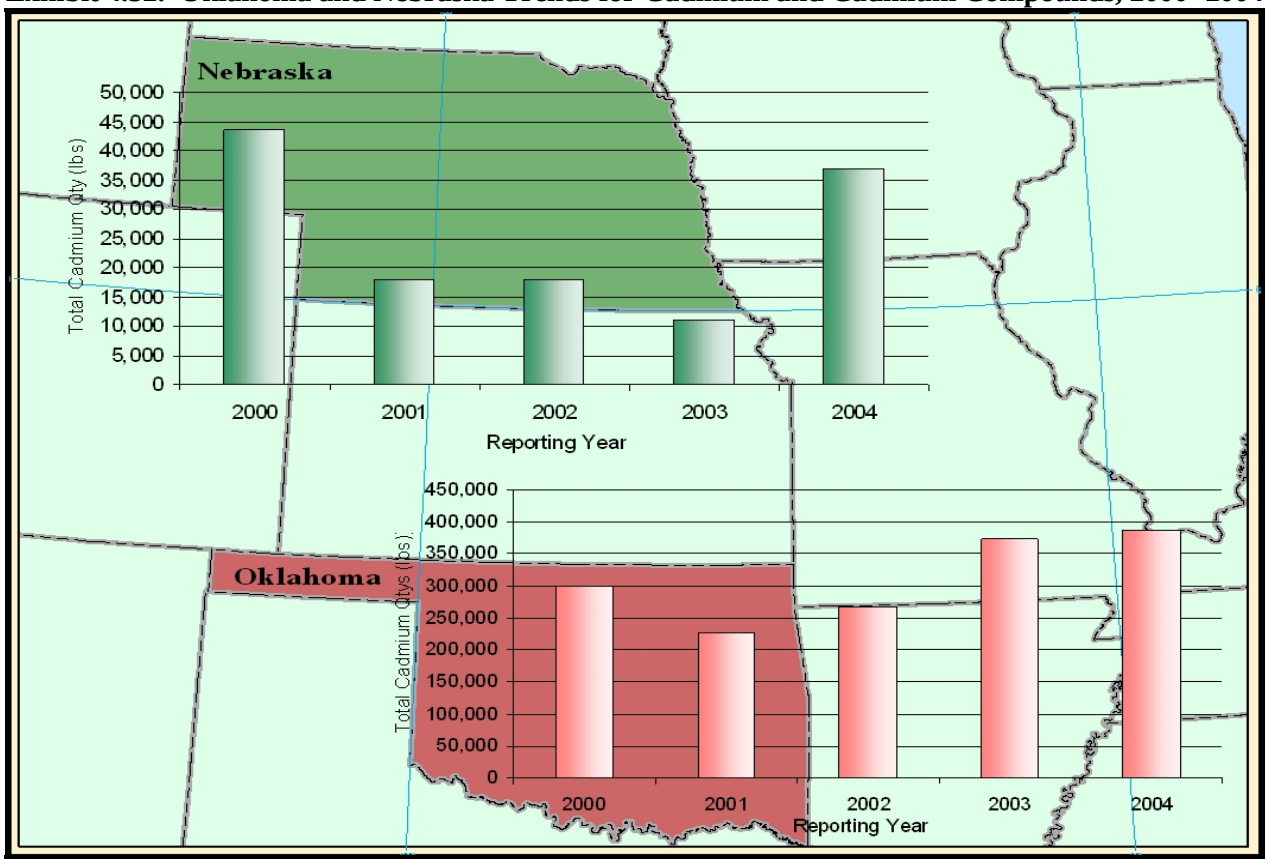


Exhibit 4.53. Idaho Trends for Cadmium and Cadmium Compounds, 2000−2004

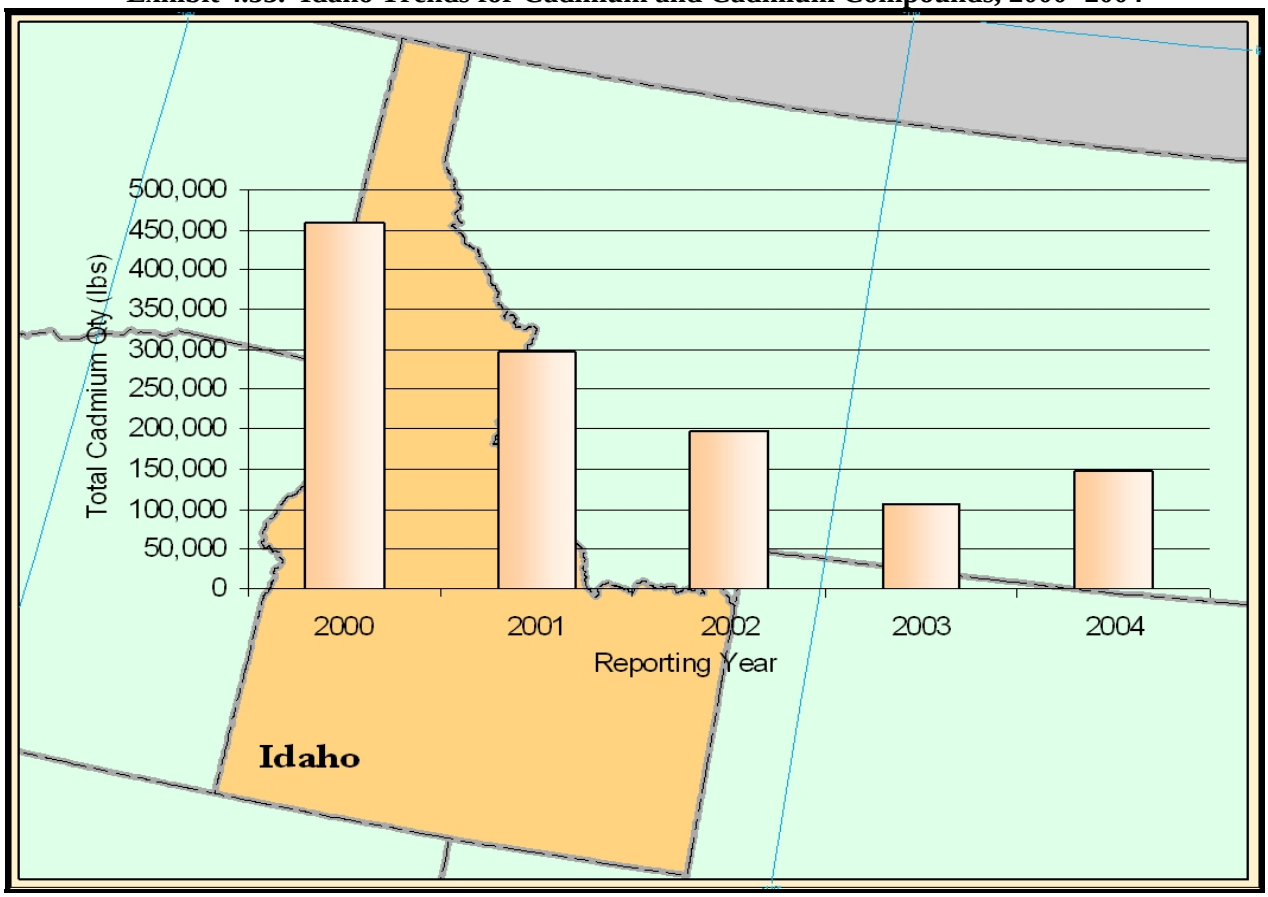
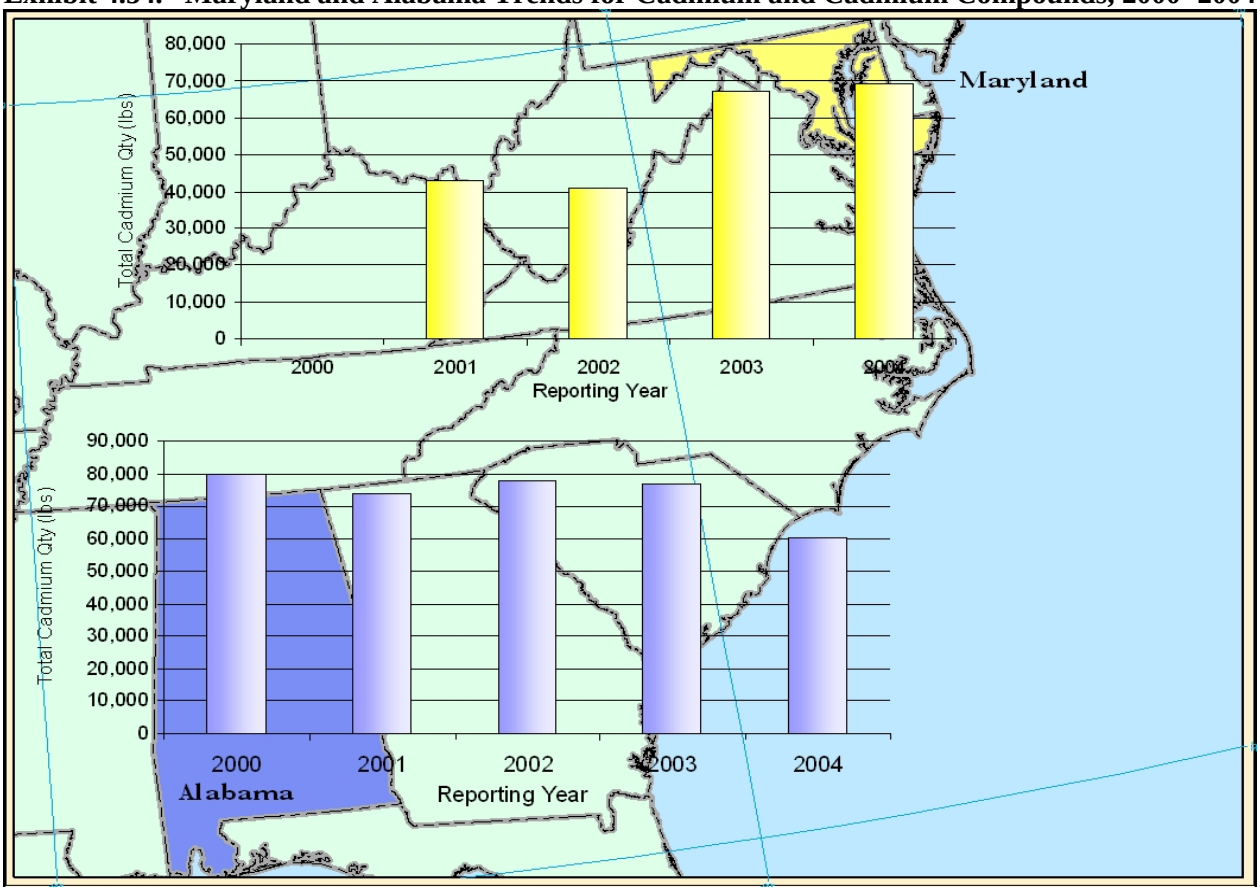


Exhibit 4.54. Maryland and Alabama Trends for Cadmium and Cadmium Compounds, 2000−2004

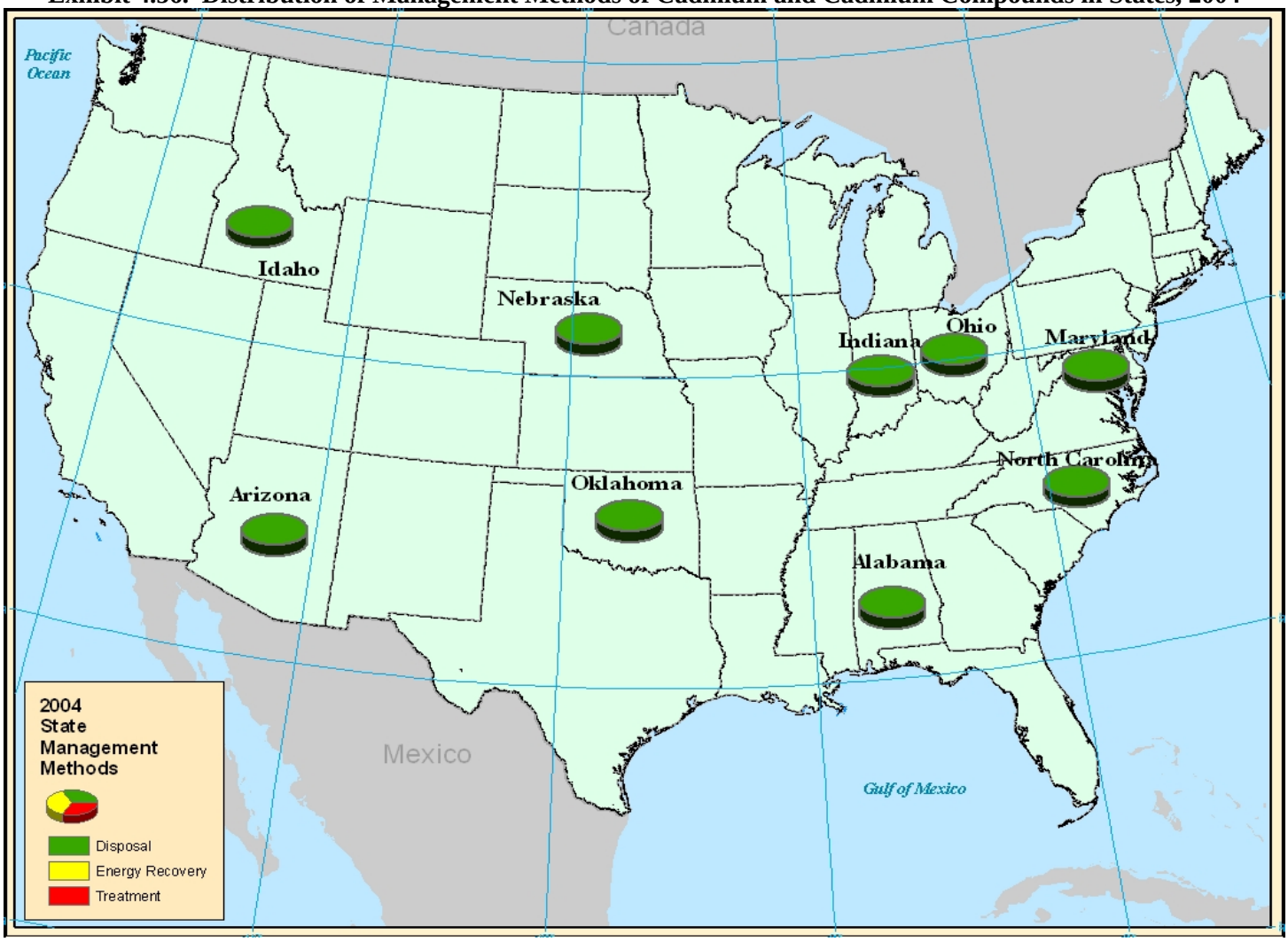


Exhibits 4.55 and 4.56 show how cadmium was managed by facilities in the nine states that accounted for 90 percent of the total quantity of this PC in 2004. A large percentage of the cadmium from facilities in these states was land disposed, mostly offsite. A facility in Idaho land disposed all its cadmium onsite. Approximately 72,000 pounds of cadmium were recycled in 2004. Most of the recycling was completed offsite. A facility in Oklahoma accounted for approximately 53 percent of the total quantity of cadmium recycled in 2004. The cadmium from this facility was derived from electric arc furnace dust during the recovery process to extract zinc and lead from these dusts. Overall, additional recycling of cadmium was hindered by such factors as the high cost of recovering low concentrations of this metal and its current relatively low market value.

Exhibit 4.55. Management Methods for Cadmium and Cadmium Compounds, Facilities in States With 90 Percent of Total Quantity, 2004

State	Quantity of Cadmium (2004)	Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
OK	386,537	28	386,509	0	0	0	0	0	38,354
ID	146,000	146,000	0	0	0	0	0	0	0
MD	69,307	0	69,307	0	0	0	0	0	0
AL	60,223	26,610	33,613	0	0	0	0	0	3,407
NE	37,000	0	37,000	0	0	0	0	0	0
OH	34,581	0	34,581	0	0	0	0	672	7,713
AZ	25,854	0	25,854	0	0	0	0	0	12,668
NC	18,773	0	18,773	0	0	0	0	0	9,032
IN	18,602	0	18,602	0	0	0	0	0	202

Exhibit 4.56. Distribution of Management Methods of Cadmium and Cadmium Compounds in States, 2004



Industry Sector (SIC) Trends:

Facilities in 42 industry sectors reported cadmium in one or more years from 2000 to 2004; facilities in 25 of these industry sectors reported this PC in 2004. Exhibit 4.57 shows the quantities of cadmium reported by facilities in the eight industry sectors that accounted for 95 percent of this chemical in 2004. The quantity decreased in five of the eight industry sectors, compared to the quantities reported in 2000. Facilities in SIC 3341 (Secondary nonferrous metals) reported the highest quantities, accounting for approximately 49 percent of the total quantity of cadmium reported in 2004. Approximately 91 percent of this quantity was reported by one facility, located in Oklahoma. The process of recovering zinc and lead from electric arc furnace dusts at this facility generates wastes containing cadmium. Facilities in the SIC 2819 (Industrial inorganic chemicals, nec) industry sector reported approximately 21 percent of the total quantity of cadmium in 2004. For this industry sector, one facility located in Idaho reported approximately 80 percent of the total quantity of cadmium. The cadmium quantity reported by this facility is derived from phosphate ores used to produce pure phosphorous. The quantity reported is primarily a function of how much phosphorous is produced and the concentration of cadmium in the phosphate ores. Although facilities in this sector reported a decrease of approximately 42 percent compared to the quantity reported in 2000, the quantity increased by 87 percent in 2004, compared to 2003.

Exhibit 4.57. Industry Sectors Reporting Cadmium and Cadmium Compounds, 2000−2004

Primary SIC	SIC Description	Number of Facilities That Reported Cadmium (2004)	2000 (pounds)	2001 (pounds)	2002 (pounds)	2003 (pounds)	2004 (pounds)	Change in Quantity (2000−2004)	Percent of Total Quantity of This PC (2004)
3341	Secondary nonferrous metals	8	354,899	253,170	306,580	433,033	429,559	74,660	48.5%
2819	Industrial inorganic chemicals, nec	3	504,425	314,677	199,423	98,067	183,020	−321,405	20.7%
2816	Inorganic pigments	3	2,891	47,677	32,072	69,032	71,520	68,629	8.1%
3691	Storage batteries	6	66,026	21,805	5,822	58,349	47,882	−18,144	5.4%
3312	Blast furnaces and steel mills	7	93,398	62,922	38,355	58,469	31,212	−62,186	3.5%
2824	Organic fibers, noncellulosic	1	47,730	44,770	40,725	35,026	29,769	−17,961	3.4%
3357	Nonferrous wire drawing and insulating	3	39,472	18,044	7,851	14,701	22,702	−16,770	2.6%
2899	Chemical preparations, nec	1	2,912	7,278	15,143	0	21,253	18,341	2.4%

Exhibit 4.58 shows how facilities managed cadmium in the eight industry sectors that accounted for 95 percent of the total quantity of this PC in 2004. A large percentage of the cadmium was sent for offsite land disposal. In 2004, facilities in these eight industry sectors reported recycling of approximately 584,000 pounds of cadmium, mostly offsite. Facilities in two of the sectors (SIC 2819−Industrial inorganic chemicals, nec and SIC 2899−Chemical preparations, nec) did not report any recycling of this PC.

Exhibit 4.58. Management Methods for Cadmium and Cadmium Compounds in Industry Sectors With 95 Percent of Total Quantity, 2004

Primary SIC	SIC Description	Total Quantity of Cadmium (2004)	Percent of Total Quantity (2004)	Onsite Disposal (pounds)	Offsite Disposal (pounds)	Onsite Energy Recovery (pounds)	Offsite Energy Recovery (pounds)	Onsite Treatment (pounds)	Offsite Treatment (pounds)	Onsite Recycling (pounds)	Offsite Recycling (pounds)
3341	Secondary nonferrous metals	429,559	48.5%	26,638	402,921	0	0	0	0	0	223,306
2819	Industrial inorganic chemicals, nec	183,020	20.7%	146,000	37,020	0	0	0	0	0	0
2816	Inorganic pigments	71,520	8.1%	0	71,520	0	0	0	0	9,000	50,000
3691	Storage batteries	47,882	5.4%	250	47,632	0	0	0	0	41,892	165,398
3312	Blast furnaces and steel mills	31,212	3.5%	13,659	17,553	0	0	0	0	672	72,083
2824	Organic fibers, noncellulosic	29,769	3.4%	0	29,769	0	0	0	0	0	3,064
3357	Nonferrous wire drawing and insulating	22,702	2.6%	0	22,702	0	0	0	0	6,249	12,432
2899	Chemical preparations, nec	21,253	2.4%	0	21,253	0	0	0	0	0	0